of D-amino acids have been showed to disperse biofilm of Gram-positive and Gram-negative bacteria. In addition, the combination of antibiotic and an antibiofilm exopolysaccharides is also a promising strategy to improve the antimicrobial activity of antibiotics. The Q*n*-prAP and QCybuAP molecules were able to disrupt *in vitro* the *E. coli* and *A. baumannii* biofilms. In addition, when macromolecules were associated with erythromycin, the biofilm disruption was more effective. In addition, Q*n*-prAP and QCybuAP, alone and combined with erythromycin, successfully prevented replication and killed the planktonic cells.

19.5 Bacteriophages

Bacteriophages, also called phages, are viruses that infect and kill bacteria with high efficacy. They were discovered independently by Frederick W. Twort in Great Britain (1915) and Félix d'Hérelle in France (1917). D'hérelle coined the term *bacteriophage*, meaning "bacteria eater," to describe the agent's bactericidal ability. Phages are obligate intracellular parasites that replicate using bacterial machinery. Bacteriophages attach to specific host receptor on the surface of bacteria – wherein every bacterium is likely to have their own specific phage – and inject their genetic material into the bacterial cell, thus possessing the ability to change the composition of microbial populations.

Like all viruses, phages are simple organisms that consist of a core of genetic material (DNA or RNA) surrounded by a protein capsid. The genetic material has different sizes, conformation (circular, linear, or segmented), and structure (dsDNA, ssDNA, dsRNA, or ssRNA). There are three basic structural forms of phage: an icosahedral (20-sided) head with a tail, an icosahedral head without a tail, and a filamentous form. Phages are ubiquitous in the biosphere and can be found living in higher organisms, mostly in digestive tract, vagina, respiratory and oral tract, skin, and mucosal epithelium, forming the phageome. It is believed that they have a significant role in human homeostasis, for example, gut phages are important for ensuring the balance of microbiota, preventing the dysbiosis.

19.5.1 Life Cycles of Bacteriophages

After phages attach to a bacterium and insert its genetic material into the cell, they follow one of two life cycles, lytic (virulent) or lysogenic (temperate). In the *lytic cycle*, the virus inserts the genetic material into the host cell, and requiring the machinery of the host cell to make lots of new phage particles than then destroy, or lyse the cell, releasing numerous new phages particles. On the other hand, in the *lysogenic cycle*, the phage inserts the genetic material into the host cell (either as a free plasmid or integrated into the chromosome,